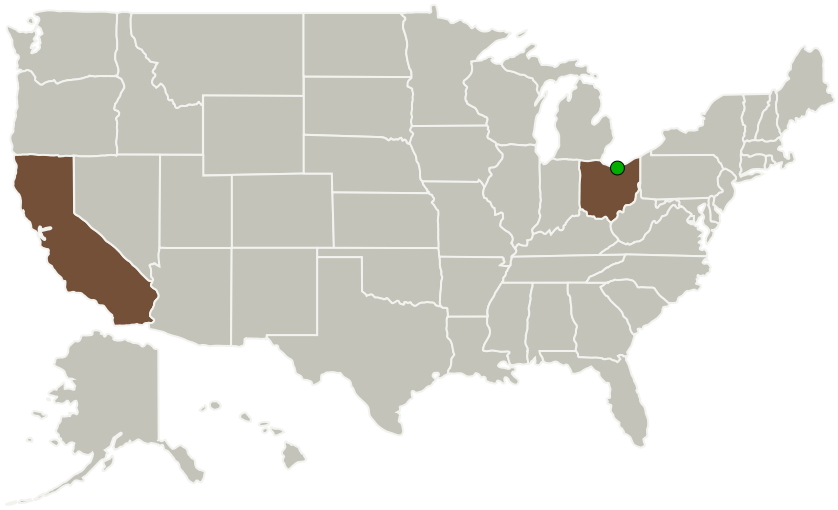
Solid State Large Area Pulsed Solar Simulator for 3-, 4- and 6-Junction Solar Cell Arrays, Phase II

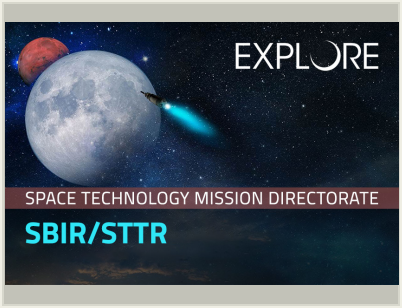
Completed Technology Project (2015 - 2017)

Project Introduction

The Phase I was successful in delivering a complete prototype of the proposed innovation, an LED-based, solid state, large area, pulsed, solar simulator (ssLAPSS). The prototype not only proved the initial concept but significantly reduced risk and dramatically increases our ability to deliver a fully functional ssLAPSS in Phase II. The proposed innovation simulates AM0 response of single, dual, 3, 4, 5 and 6 junction solar cells by using an array of different wavelength LEDs in close proximity to the solar panel string under test. The ssLAPSS is adjustable in spectrum for selected wavelengths and Class A, the highest standard, for spatial uniformity and temporal stability. The ssLAPSS consists of LED modules that are repositioned in a mounting frame to test many strings on a panel in sequence. The ssLAPSS also includes optical sensors so that all metrics can be calibrated and validated automatically. Solar simulation is critical for all solar cell testing, and current large area, pulsed solar simulators will not work for coming 4, 5 and 6 junction technologies. Because the vast majority of NASA missions rely on solar cells, this is critical, enabling test technology for future solar cells. While accurate solar simulation is critical to all solar cell missions, it is particularly important to missions requiring large amounts of power, such as solar electric propulsion (SEP) missions. Beyond NASA's needs, other members of the aerospace community, including prime contractors, solar panel integrators and solar cell manufacturers have a critical need for this capability, which presents excellent commercialization opportunities after the Phase II maturation of the technology.

Primary U.S. Work Locations and Key Partners





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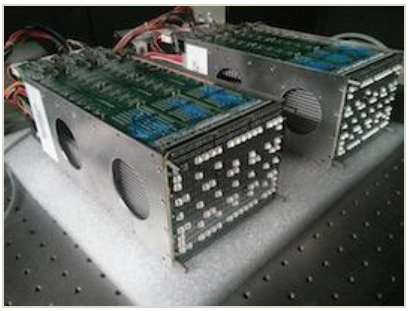
Completed Technology Project (2015 - 2017)

Organizations Performing Work	Role	Type	Location
Angstrom Designs, Inc.	Lead Organization	Industry	Santa Barbara, California
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
California	Ohio

Images



Briefing Chart
Solid State Large Area Pulsed Solar Simulator for 3-, 4- and 6-Junction Solar Cell Arrays Briefing Chart *(https://techport.nasa.gov/image/128395)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Angstrom Designs, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Casey P Hare

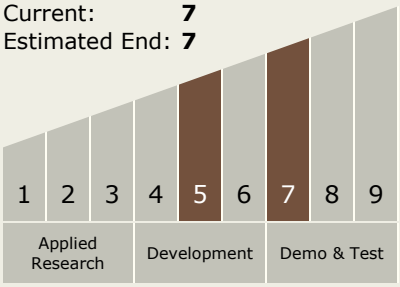
Co-Investigator:
Casey Hare

Solid State Large Area Pulsed Solar Simulator for 3-, 4- and 6-Junction Solar Cell Arrays, Phase II

Completed Technology Project (2015 - 2017)

Technology Maturity (TRL)

Start: **5**
Current: **7**
Estimated End: **7**



Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.1 Power Generation and Energy Conversion
    - TX03.1.1 Photovoltaic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System